Electronic Supplementary Material (ESI) for RSC Advances.

Supplementary Information

"Directly deposited Nafion/TiO_2 composite membranes for high power medium temperature fuel cells"

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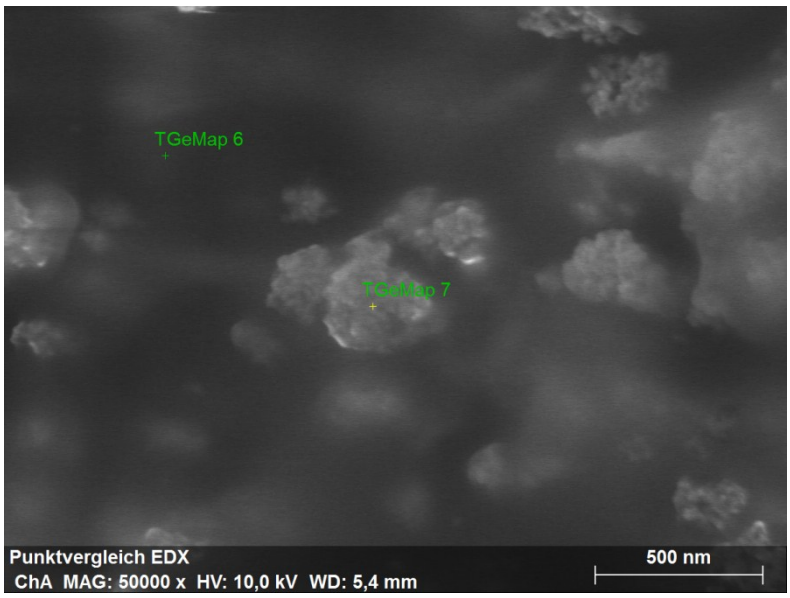
1. EDX-measurements

EDX-measurements were performed on the MEA-cross section shown in Figure 3 in the manuscript. By comparing the two measurement points (TGeMap6 and TGeMap7) it can be seen that the observed agglomerates correspond to TiO_2 particles. The point TGeMap 6 showed a reduced content of TiO_2, proofing that TiO_2 nanoparticles are also dispersed within the membrane ionomer.



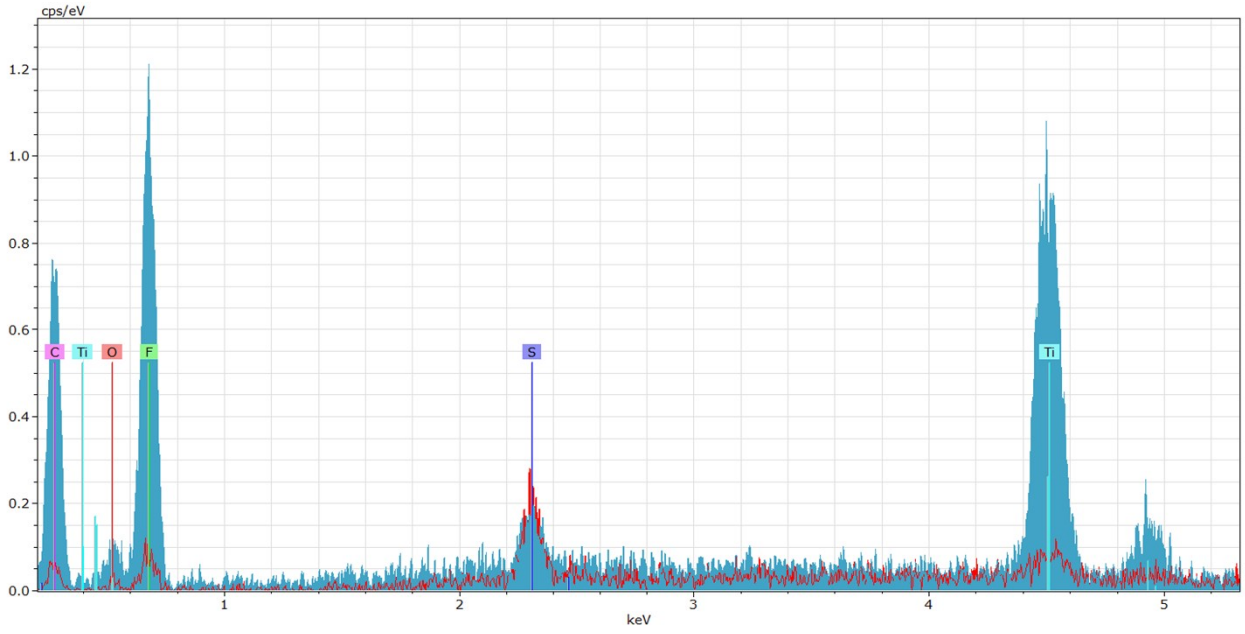


Figure 1: EDX-measurement of a MEA cross-section of the directly deposited TiO_2/Nafion membrane. The red spectrum corresponds to the point TGeMap 6, the green spectrum corresponds to the point TGeMap 7.

2. Polarization measurements

To avoid confusion about the different membrane thicknesses of the DMD samples, additional polarization measurements are shown here at an operation temperature of 120 °C (same operation conditions: 0.5/0.5 l/min H_2/O_2, 300/300 kPa_{abs}). Figure 2 includes all samples presented in the work: The Nafion HP reference sample, the 15 µm thick TiO_2/Nafion DMD sample, the 20 µm thick TiO_2/Nafion DMD sample and the 20 µm thick pure Nafion DMD sample.

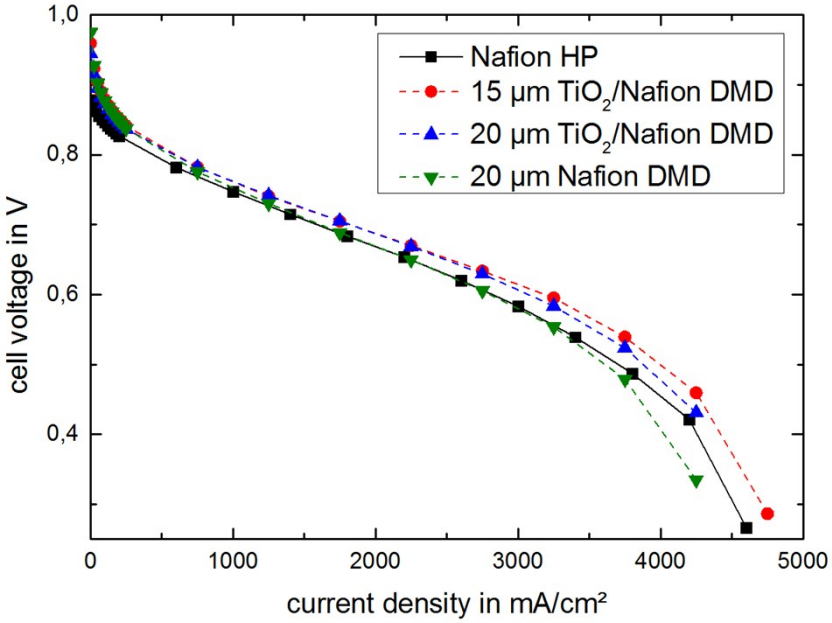


Figure 2: Comparison of polarization data of different DMD samples and the Nafion HP reference fuel cell.